Time: 2 hours **Board Paper – March 2022** **Total Marks:**

Note:
(i) All questions are compulsory.
(ii) Use of calculator is not allowed.
(iii) The numbers to the right of the questions indicate full marks.
(iv) In case of MCQs [Q.No.1(A)], only the first attempt will be evaluated and will be given credit.
(v) For every MCQ, the correct alternative (A), (B), (C) or (D) with sub-question number is to be written as an answer.
(vi) Draw proper figures for answers wherever necessary.
(vii) The marks of construction should be clear. Do not erase them.
(viii) Diagram is essential for writing the proof of the theorem.

Q.1. (A) For each of the following sub-questions four alternative answers are given. Choose the correct alternative and write its alphabet: **[4]**

(1) If $\Delta ABC \sim \Delta DEF$ and $\angle A = 48°$, then $\angle D =$ _____.

(a) 48° (b) 83° (c) 49° (d) 132°

(2) AP is a tangent at A drawn to the circle with centre O from an external point P. OP = 12 cm and $\angle OPA = 30°$, then the radius of the circle is _____.

(a) 12 cm (b) $6\sqrt{3}$ cm (c) 6 cm (d) $12\sqrt{3}$ cm

(3) Seg AB is parallel to X-axis and co-ordinates of the point A are (1, 3), then the co-ordinates of the point B can be _____.

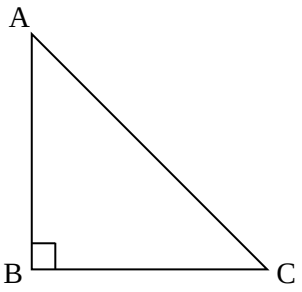
(a) (–3, 1) (b) (5, 1) (c) (3, 0) (d) (–5, 3)

(4) The value of $2\tan 45° - 2\sin 30°$ is _____.

(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

Q.1. (B) Solve the following sub-questions: **[4]**

(1)



In ΔABC, $\angle ABC = 90°$, $\angle BAC = \angle BCA = 45°$. If $AC = 9\sqrt{2}$, then find the value of AB.

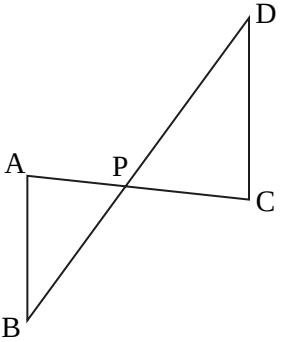
(2) Chord AB and chord CD of a circle with centre O are congruent. If $m(\text{arc AB}) = 120°$, then find $m(\text{arc CD})$.

(3) Find the Y co-ordinate of the centroid of a triangle whose vertices are (4, –3), (7, 5) and (–2, 1).

(4) If $\sin\theta = \cos\theta$, then what will be the measure of angle θ?

Q.2. (A) Complete the following activities and rewrite them (any *two*): **[4]**

(1) In the alongside figure, seg AC and seg BD intersect each other in point P. If $\frac{AP}{CP} = \frac{BP}{DP}$, then complete the following activity to prove $\Delta ABP \sim \Delta CDP$.



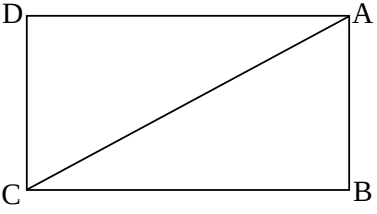
Activity: In ΔAPB and ΔCDP

$\frac{AP}{CP} = \frac{BP}{DP}$ ...[ ]

$\therefore$ $\angle APB \cong$ [ ] ...Vertically opposite angles

$\therefore$ [ ] $\sim \Delta CDP$ ...[ ] test of similarity.

(2) In the alongside figure, $\square ABCD$ is a rectangle. If AB = 5, AC = 13, then complete the following activity to find BC.



Activity:

ΔABC is $\square$ triangle.

$\therefore$ By Pythagoras theorem,

$AB^2 + BC^2 = AC^2$

$\therefore \quad 25 + BC^2 = \square$

$\therefore \quad BC^2 = \square$

$\therefore \quad BC = \square$

(3) Complete the following activity to prove:

$\cot\theta + \tan\theta = \text{cosec}\,\theta \times \sec\theta$

Activity:

L.H.S. $= \cot\theta + \tan\theta$

$$= \frac{\cos\theta}{\sin\theta} + \frac{\square}{\cos\theta}$$

$$= \frac{\square + \sin^2\theta}{\sin\theta \times \cos\theta}$$

$$= \frac{1}{\sin\theta \times \cos\theta} \quad \ldots\ldots\ldots \because \square$$

$$= \frac{1}{\sin\theta} \times \frac{1}{\cos\theta}$$

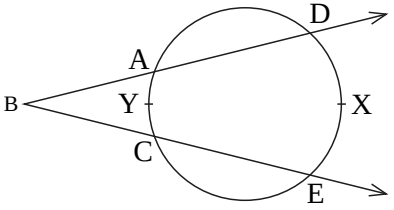
$= \square \times \sec\theta$

$\therefore$ L.H.S. = R.H.S.

Q.2. (B) Solve the following sub-questions (any *four*): [8]

(1) If $\Delta ABC \sim \Delta PQR$, AB:PQ = 4:5 and $A(\Delta PQR) = 125\ cm^2$, then find $A(\Delta ABC)$.

(2) In the following figure, m(arc DXE) = 105°, m(arc AYC) = 47°, then find the measure of $\angle DBE$.



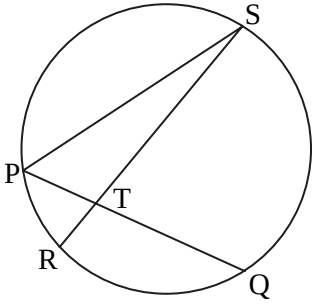
(3) Draw a circle of radius 3.2 cm and centre 'O'. Take any point P on it. Draw a tangent to the circle through point P using the centre of the circle.

(4) If $\sin\theta = \frac{11}{61}$, then find the value of $\cos\theta$ using trigonometric identity.

(5) In ΔABC, AB = 9 cm, BC = 40 cm, AC = 41 cm. State whether ΔABC is a right-angled triangle or not. Write reason.

Q.3. (A) Complete the following activity and rewrite it (any *one*): [3]

(1) In the alongside figure, chord PQ and chord RS intersect each other at point T. If $\angle STQ = 58°$ and $\angle PSR = 24°$, then complete the following activity to verify:



$\angle STQ = \frac{1}{2}[m(\text{arc PR}) + m(\text{arc SQ})]$

Activity:

In ΔPTS,

$\angle SPQ = \angle STQ -$ ☐ .....Exterior angle theorem

$\therefore \quad \angle SPQ = 34°$

$\therefore \quad m(\text{arc QS}) = 2 \times$ ☐ $° = 68°$ ..... ☐

Similarly, $m(\text{arc PR}) = 2\angle PSR =$ ☐ $°$

$\therefore \quad \frac{1}{2}[m(\text{arc QS}) + m(\text{arc PR})] = \frac{1}{2} \times$ ☐ $° = 58°$ ..... (I)

But $\angle STQ = 58°$ ..... (II), given

$\therefore \quad \frac{1}{2}[m(\text{arc PR}) + m(\text{arc QS})] =$ ☐ ..... From (I) and (II)

(2) Complete the following activity to find the co-ordinates of point P which divides seg AB in the ratio 3:1 where A(4, –3) and B(8, 5).

Activity:

By section formula,

$$x = \frac{mx_2 + nx_1}{\square}, \qquad y = \frac{\square}{m + n}$$

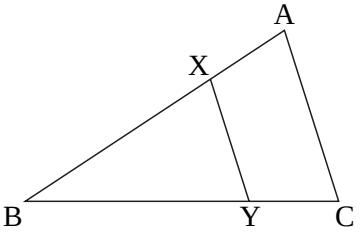
$\therefore \quad x = \dfrac{3 \times 8 + 1 \times 4}{3 + 1}, \qquad y = \dfrac{3 \times 5 + 1 \times (-3)}{3 + 1}$

$= \dfrac{\square + 4}{4}, \qquad = \dfrac{\square - 3}{4}$

$\therefore \quad x = \square, \qquad \therefore \quad y = \square$

Q.3. (B) Solve the following sub-questions (any *two*): [6]

(1) In ΔABC, seg XY $\parallel$ side AC. If $2AX = 3BX$ and $XY = 9$, then find the value of AC.



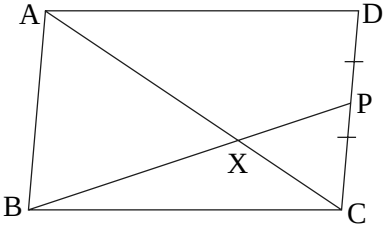
(2) Prove that "Opposite angles of cyclic quadrilateral are supplementary."

(3) $\Delta ABC \sim \Delta PQR$. In ΔABC, AB = 5.4 cm, BC = 4.2 cm, AC = 6.0 cm, AB:PQ = 3:2, then construct ΔABC and ΔPQR.

(4) Show that:

$$\frac{\tan A}{(1 + \tan^2 A)^2} + \frac{\cot A}{(1 + \cot^2 A)^2} = \sin A \times \cos A$$

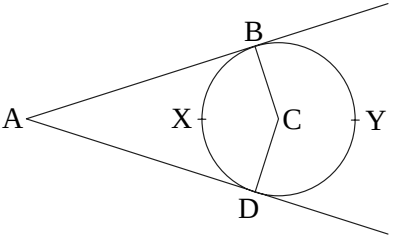
Q.4. Solve the following sub-questions (any *two*): [8]

(1) 

$\square$ABCD is a parallelogram. Point P is the midpoint of side CD. Seg BP intersects diagonal AC at point X, then prove that:

$3AX = 2AC$

(2) In the alongside figure, seg AB and seg AD are tangent segments drawn to a circle with centre C from exterior point A, then prove that:



$\angle A = \dfrac{1}{2}[m(\text{arc BYD}) - m(\text{arc BXD})]$

(3) Find the co-ordinates of centroid of a triangle if points D(–7, 6), E(8, 5) and F(2, –2) are the midpoints of the sides of that triangle.

Q.5. Solve the following sub-question (any *one*): [3]

(1) a and b are natural numbers and $a > b$. If $(a^2 + b^2)$, $(a^2 – b^2)$ and $2ab$ are the sides of a triangle, then prove that the triangle is right angled.

Find out two Pythagorean triplets by taking suitable values of a and b.

(2) Construct two concentric circles with centre O and radii 3 cm and 5 cm. Construct a tangent to the smaller circle from any point A on the larger circle. Measure and write the length of the tangent segment. Calculate the length of the tangent segment using Pythagoras theorem.